

FIG. 1(a)

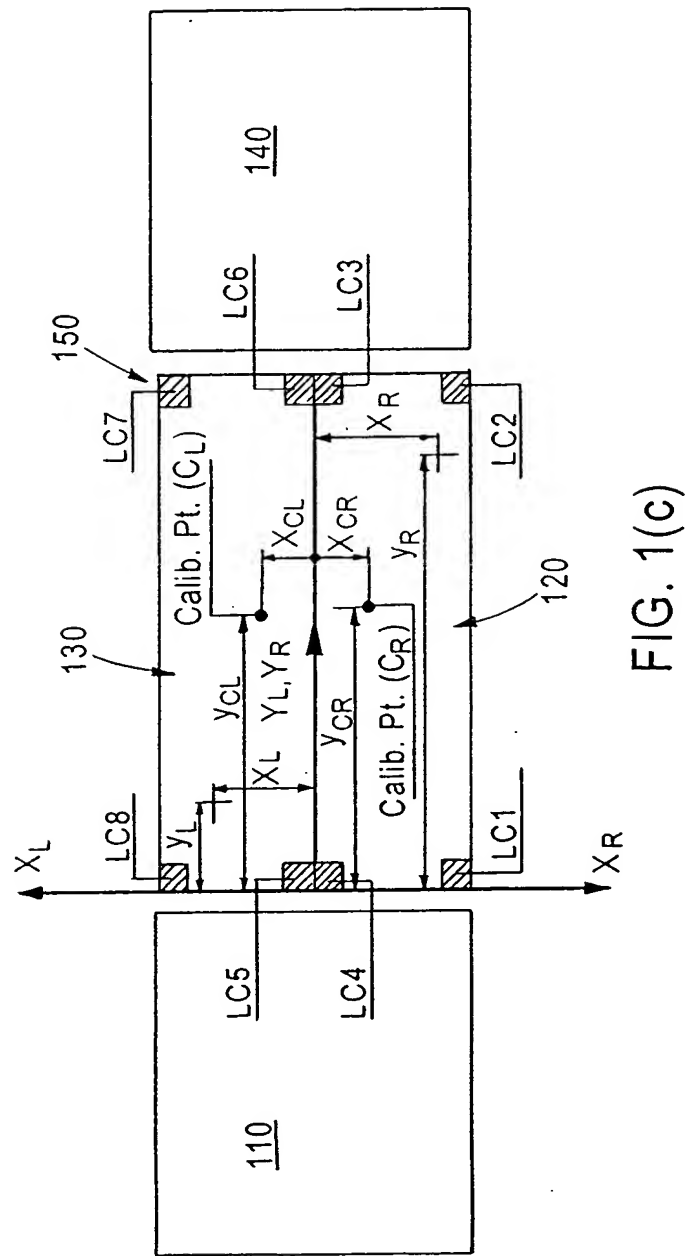
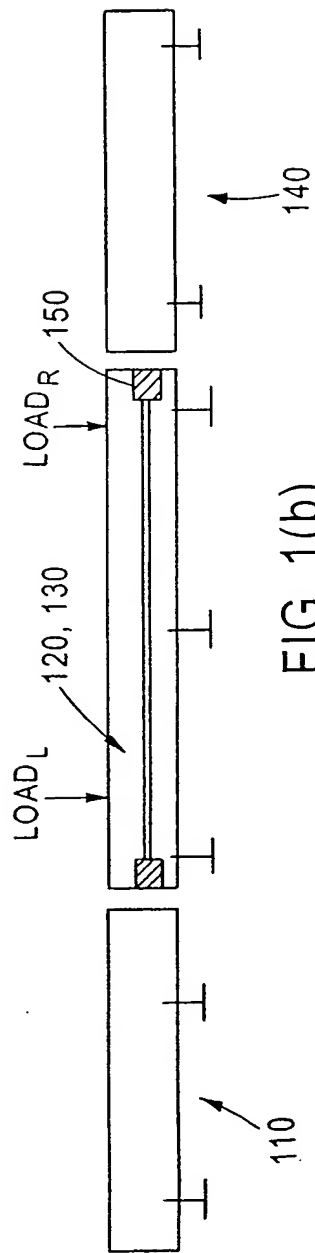
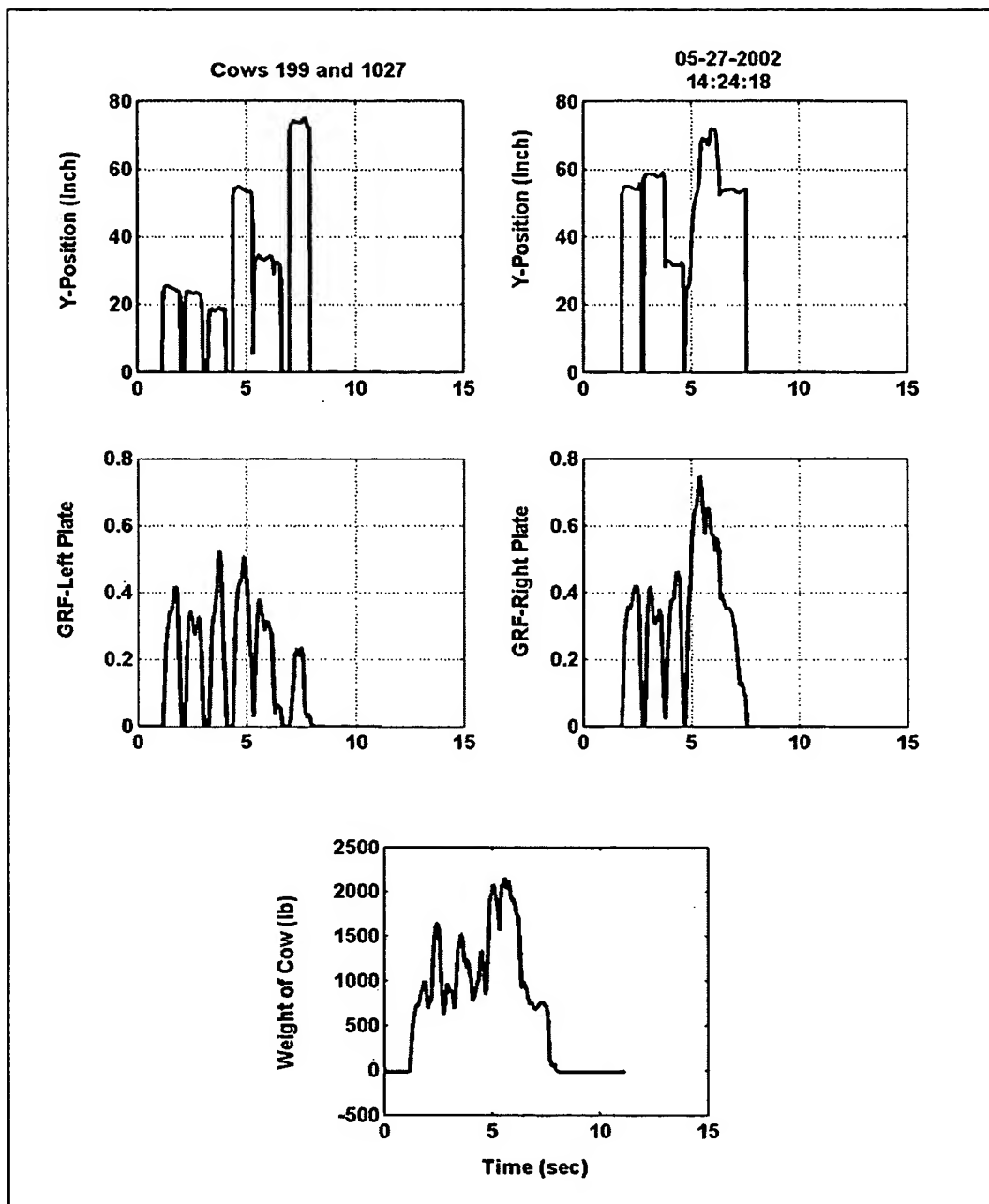


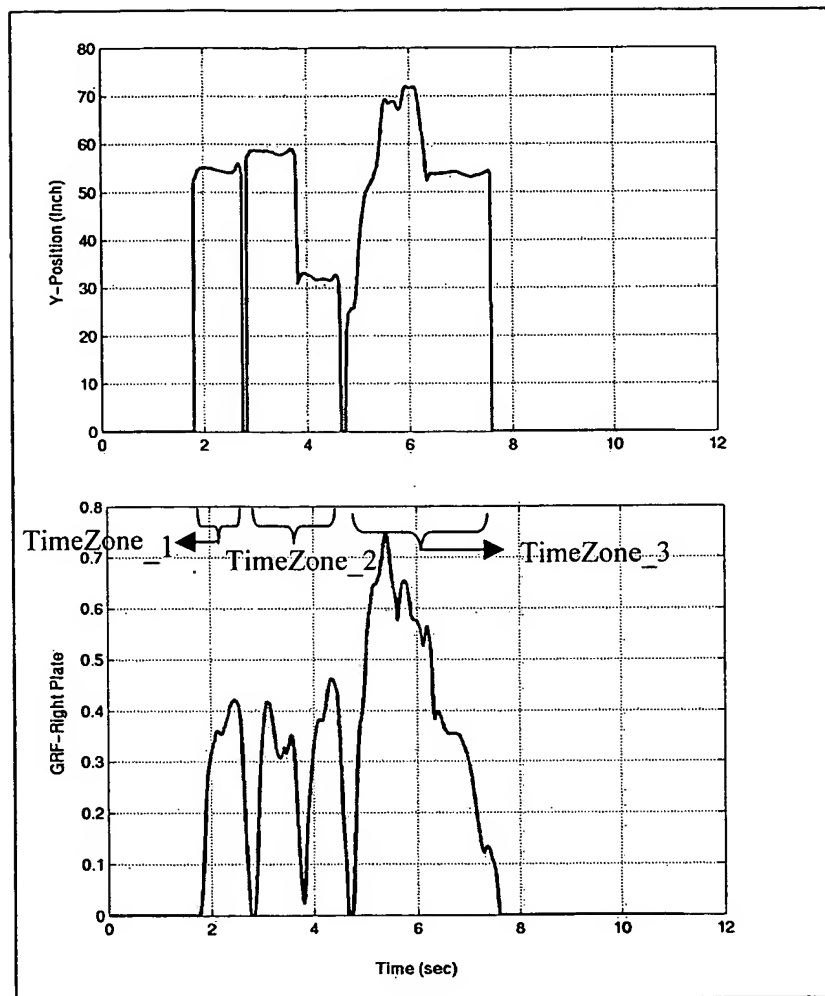
Table 1. A sample of an YYMMDDxxx.ID file

| Time     | File running number<br>YYMMDDxxx | Cow's Transponder | Cow's Number | Number of<br>cows per file<br>( <i>n</i> ) |
|----------|----------------------------------|-------------------|--------------|--|
| 14:24:18 | 020527020                        | 18276             | 199          | 2  |
| 14:24:18 | 020527020                        | 17112             | 1027         |  |
| 14:28:13 | 020527021                        | 17212             | 961          | 4  |
| 14:28:13 | 020527021                        | 17225             | 217          |  |
| 14:28:13 | 020527021                        | 18231             | 980          |  |
| 14:28:13 | 020527021                        | 15293             | 1026         |  |
| 14:33:18 | 020527022                        | 20756             | 991          | 3  |
| 14:33:18 | 020527022                        | 23221             | 213          |  |
| 14:33:18 | 020527022                        | 25260             | 885          |  |

**Figure 2**



**Figure 3**



**Figure 4**

Table 3. Definitions of the statistical parameters evaluated in each TimeZone. The parameters are based on Y position and GRF values.

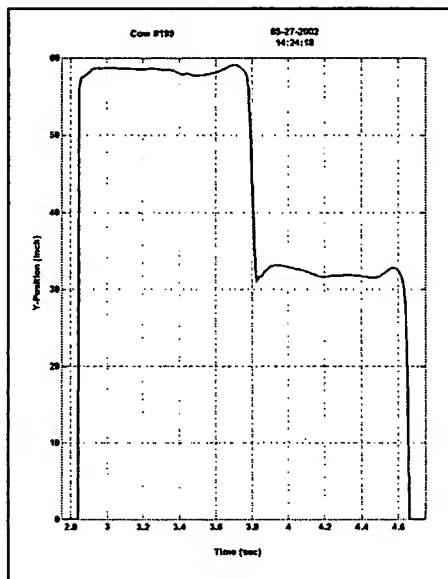
| <b>LimbZoneStatistics</b> | <b>Description</b>  |
|---------------------------|---|
| Yave                      | Average value of Y position   |
| Ymax                      | Maximum value of Y position   |
| Ymin                      | Minimum value of Y position   |
| YSLOPEmax                 | Maximum Y position slope  |
| tYSLOPEmax                | Time at which maximum Y position slope occurs                       |
| YSLOPEmin                 | Minimum Y position slope  |
| tYSLOPEmin                | Time at which minimum Y position slope occurs                       |
| PGRF                      | Peak Ground Reaction Force  |
| AGRF                      | Average Ground Reaction Force                                       |
| GRF_pos_SLOPE             | Counter of positive GRF slopes                                      |
| GRF_neg_SLOPE             | Counter of negative GRF slopes                                      |
| Delta_GRF_SLOPE           | The number of times GRF changes its slope from positive to negative |
| J_Limb                    | Number of limbs in a time zone                                      |

## **Figure 5**

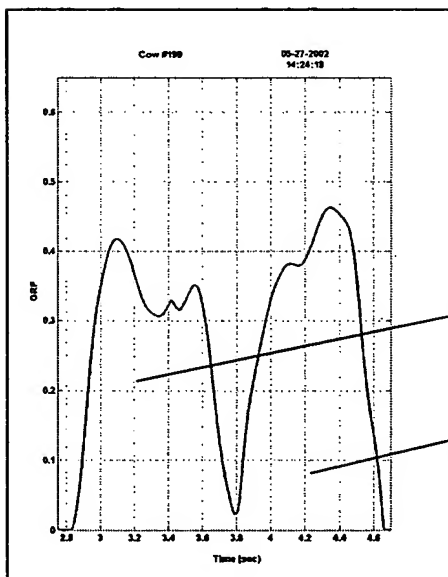
Table 3. Numerical values of LimbZoneStatistics for the data plots shown in Figure 4. TimeZone\_1 reflects a single limb (J\_Limb = 1), TimeZone\_2 reflects 2 limbs (J\_Limb = 2), and TimeZone\_3 reflects 3 limbs (J\_Limb = 3)

| <b>LimbZoneStatistics</b><br><b>file 020527020</b> | <b>TimeZone_1</b> | <b>TimeZone_2</b> | <b>TimeZone_3</b> |
|--|-------------------|-------------------|-------------------|
| Yave   | 54.58             | 45.99             | 56.40             |
| Ymax   | 55.05             | 59.10             | 71.91             |
| Ymin   | 53.99             | 30.96             | 25.49             |
| YSLOPEmax  | 0.98              | 2.10              | 14.28             |
| tYSLOPEmax   | 2.54              | 3.82              | 4.97              |
| YSLOPEmin  | -0.36             | -28.03            | -10.56            |
| tYSLOPEmin   | 2.18              | 3.72              | 6.23              |
| PGRF   | 0.42              | 0.46              | 0.75              |
| AGRF   | 0.36              | 0.32              | 0.46              |
| GRF_pos_SLOPE                                      | 0                 | 1                 | 73                |
| GRF_neg_SLOPE                                      | 0                 | 14                | 26                |
| DeltaGRF_SLOPE                                     | 3                 | 7                 | 9                 |
| J_Limb   | <b>1</b>          | <b>2</b>          | <b>3</b>          |
| LimbSequence                                       | <b>F</b>          | -                 | -                 |

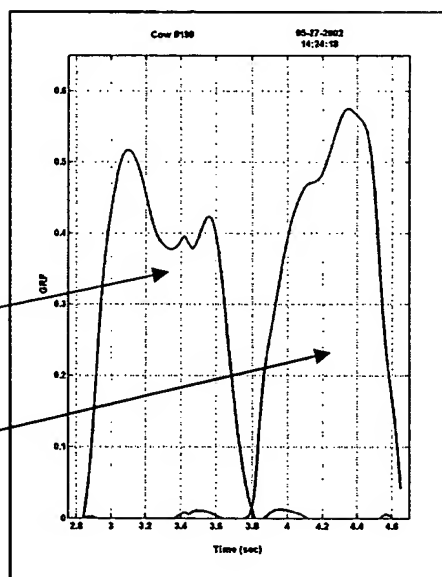
**Figure 6**



**Figure 7(a)**



**Figure 7(b)**



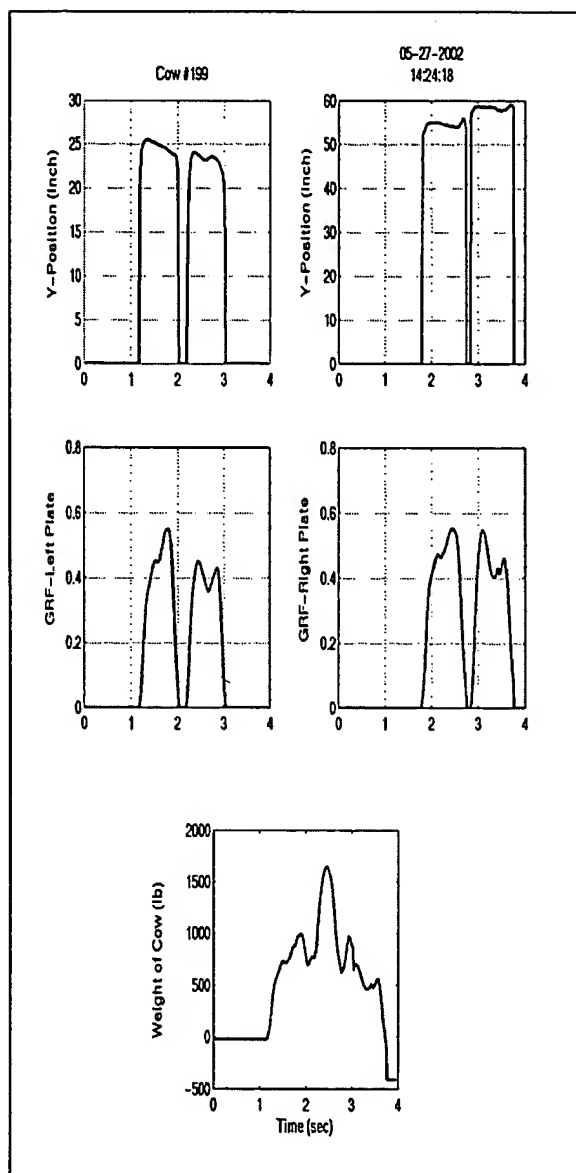
**Figure 7(c)**



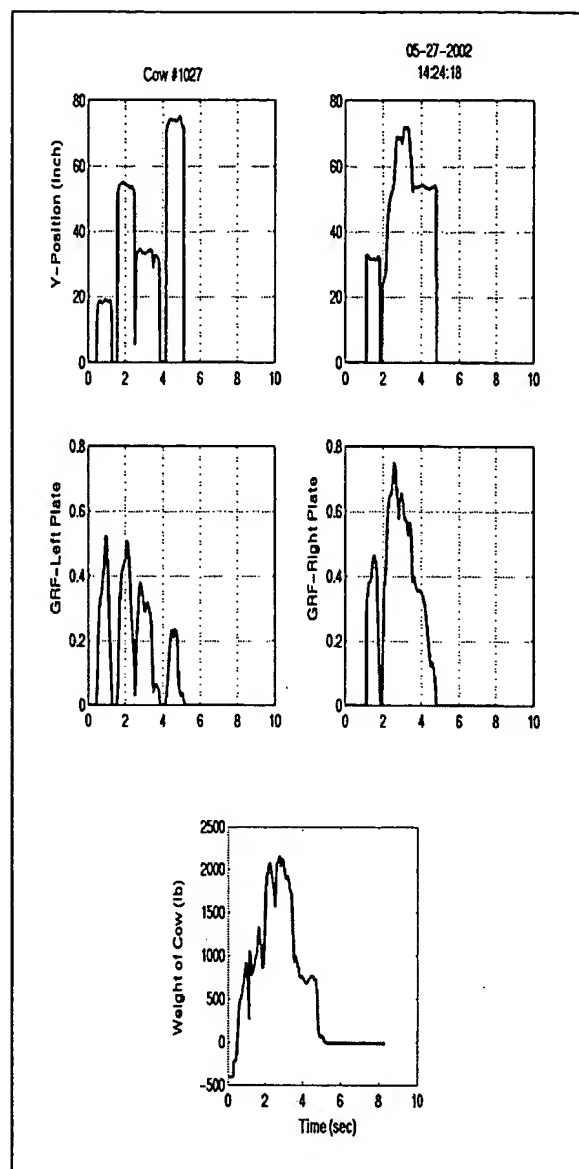
| LimbZoneStatistics<br>for file 020527020<br>(n=2) | 1 <sup>st</sup> Animal<br>Cow 199 |         | (n-1) animals<br>Cow 1027 |        |
|---|-----------------------------------|---------|---------------------------|--------|
|   | Time                              | Time    | Time                      | Time   |
|   | Zone_1                            | Zone_21 | Zone_22                   | Zone_3 |
| Yave  | 54.58                             | 58.40   | 32.14                     | 56.40  |
| Ymax  | 55.05                             | 58.40   | 32.14                     | 71.91  |
| Ymin  | 53.99                             | 58.40   | 32.14                     | 25.49  |
| YSLOPEmax   | 0.98                              | 0.73    | 1.01                      | 14.28  |
| tYSLOPEmax  | 2.54                              | 3.55    | 4.45                      | 4.97   |
| YSLOPEmin   | -0.36                             | -0.63   | -0.82                     | -10.56 |
| tYSLOPEmin  | 2.18                              | 3.32    | 4.06                      | 6.23   |
| PGRF  | 0.42                              | 0.42    | 0.47                      | 0.75   |
| AGRF  | 0.36                              | 0.35    | 0.39                      | 0.46   |
| GRF_pos_SLOPE                                     | 0                                 | 0       | 0                         | 73     |
| GRF_neg_SLOPE                                     | 0                                 | 0       | 0                         | 26     |
| DeltaGRF_SLOPE                                    | 3                                 | 5       | 1                         | 9      |
| J_Limb  | 1                                 | 1       | 1                         | 3      |
| LimbSequence                                      | F                                 | H       | F                         | -      |

Table 4: TimeZone\_2 (Table 3) is a two limb zone (J\_Limb=2) and the TwoLimbSeparation function is called to convert TimeZone2 into TimeZone\_21 and 22. The limb zone statistics are calculated for the two separated time zones and the LimbSequence

## **Figure 8**



**Figure 9(a)**



**Figure 9(b)**

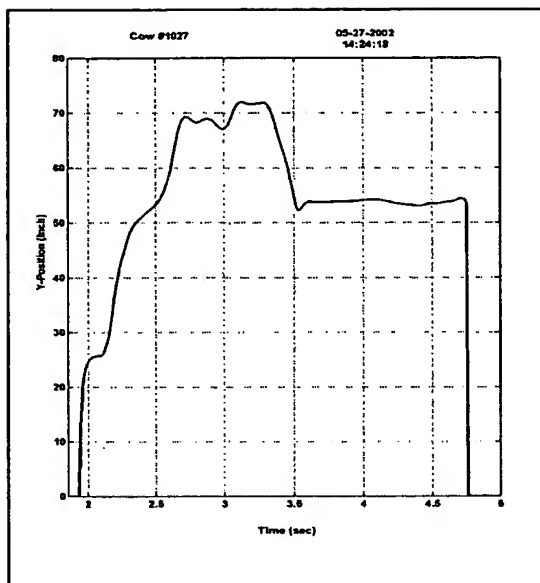


Figure 10(a)

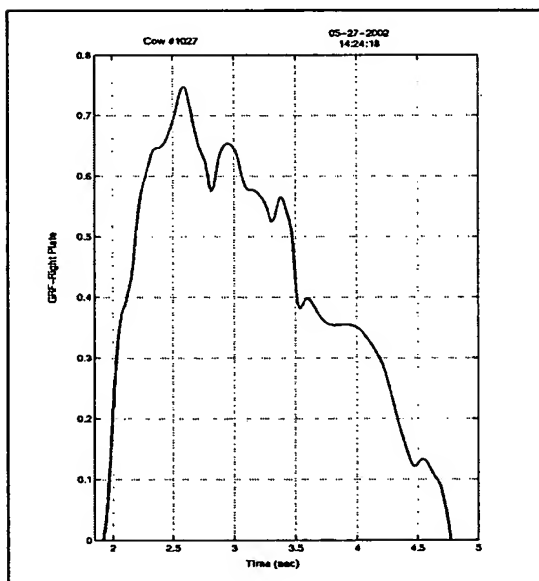


Figure 10(b)

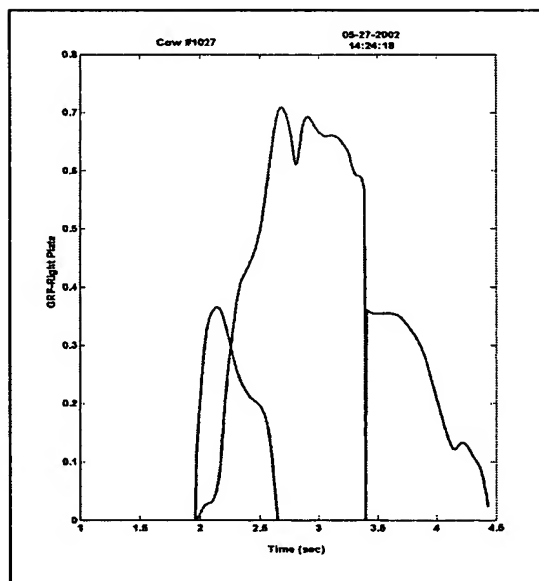
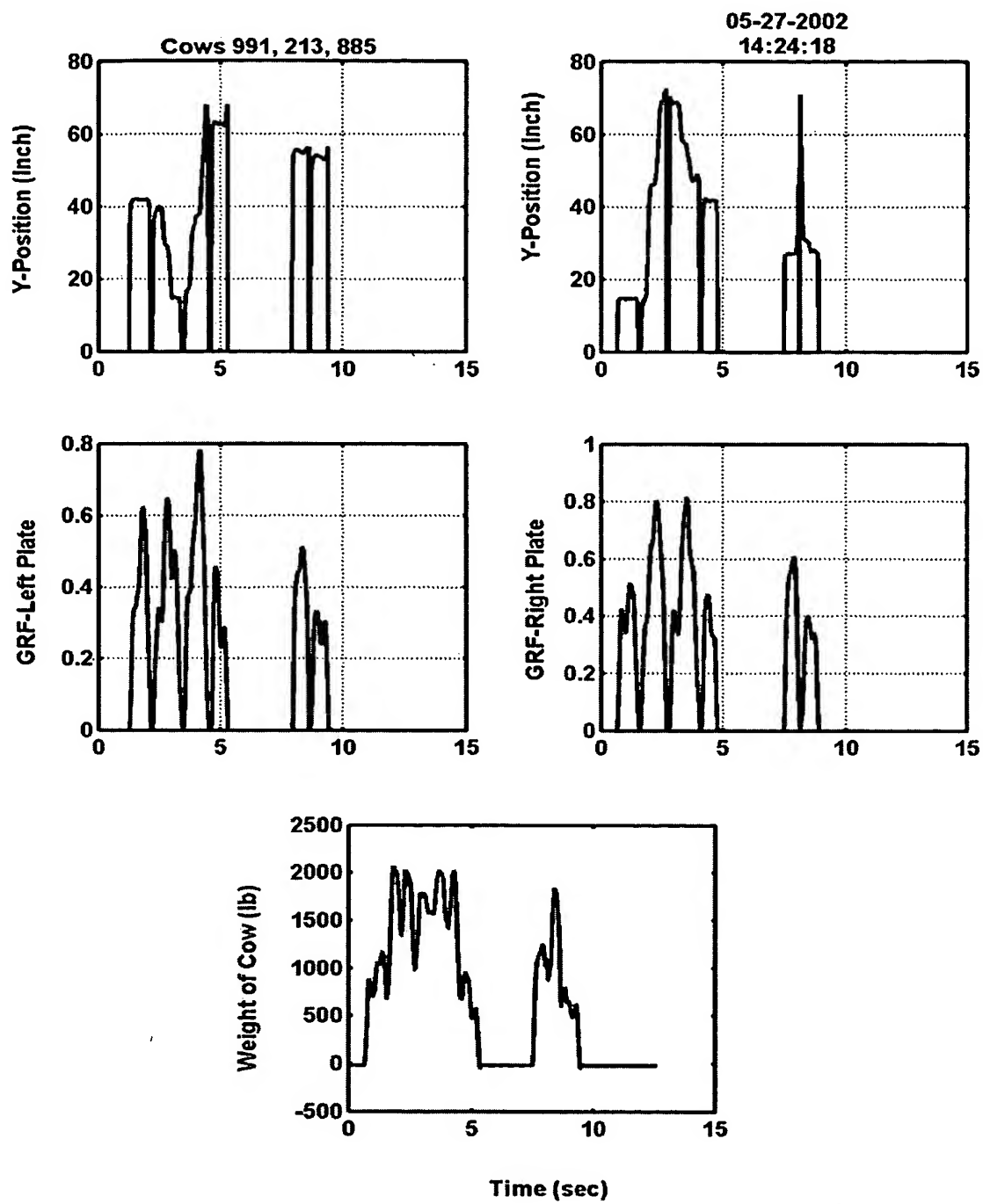
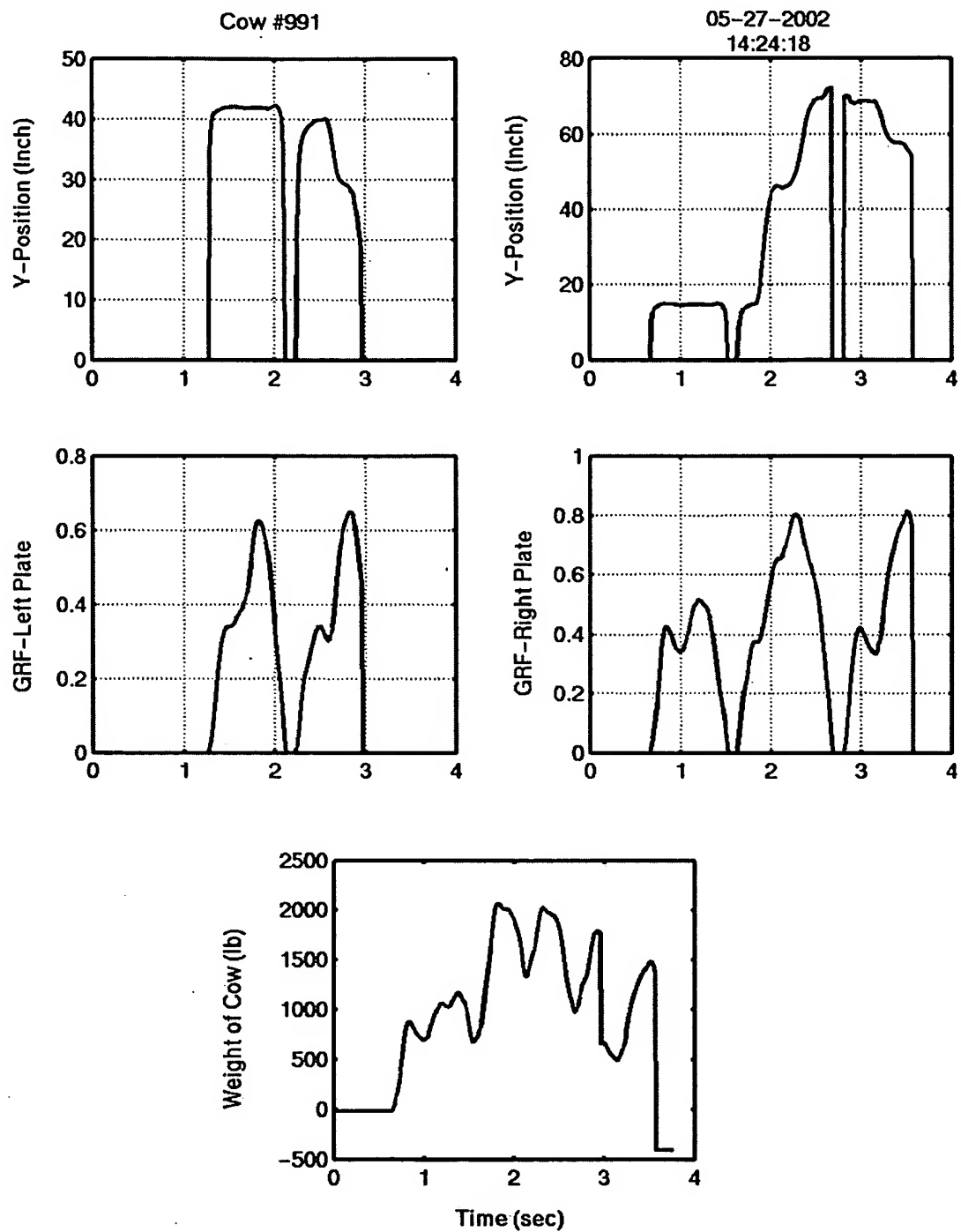


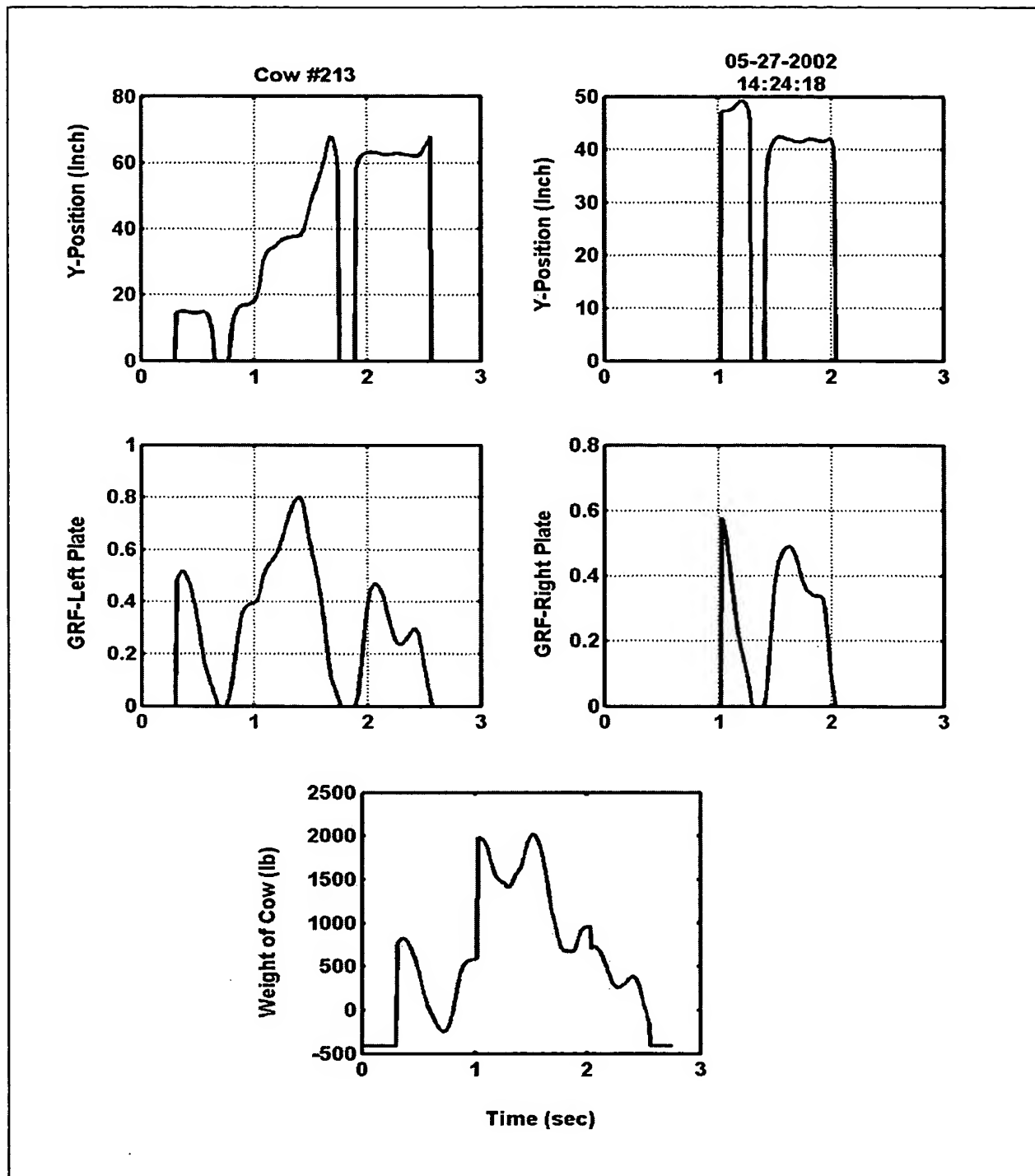
Figure 10(c)



***Figure 11(a)***



**Figure 11(b)**



**Figure 11(c)**

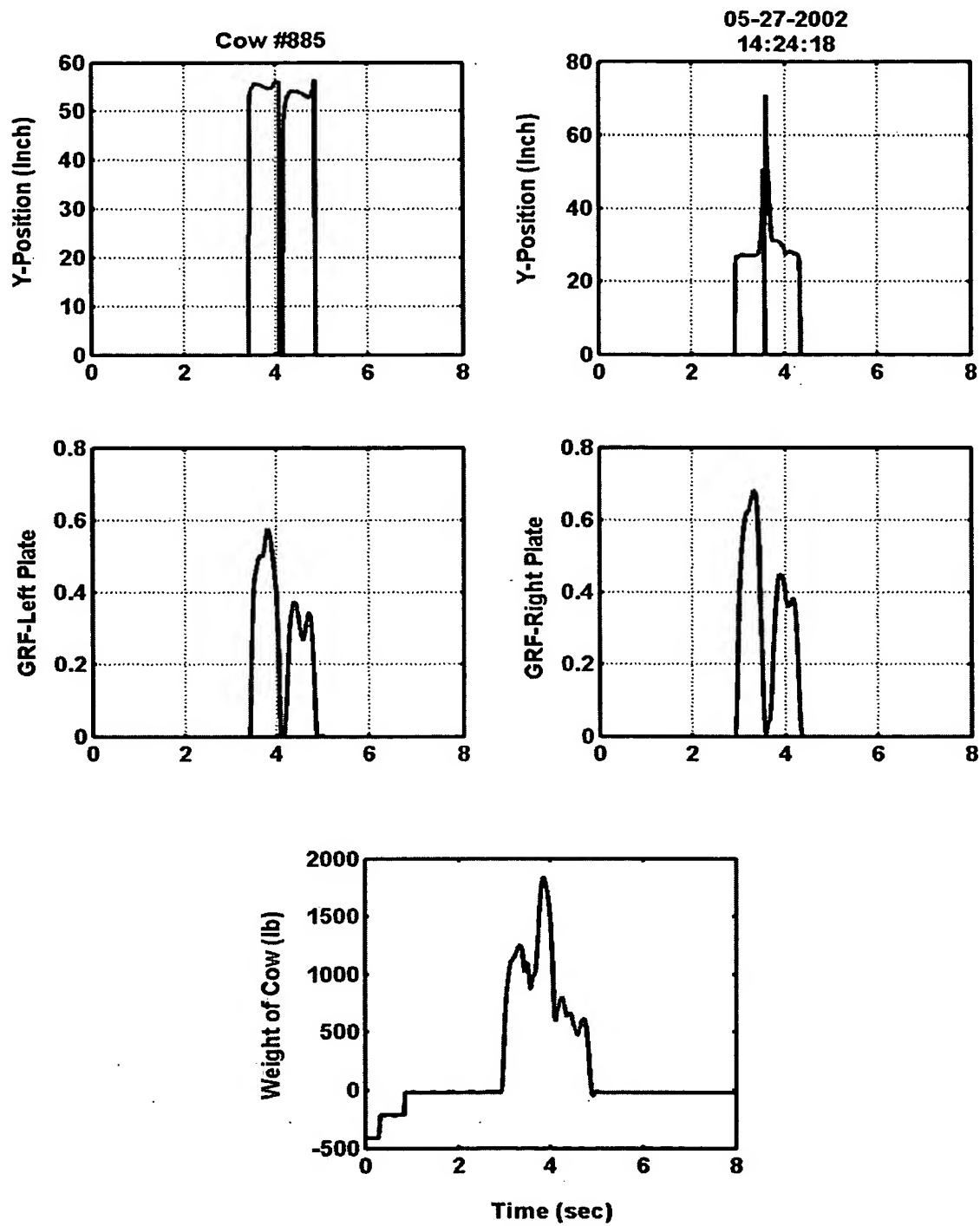
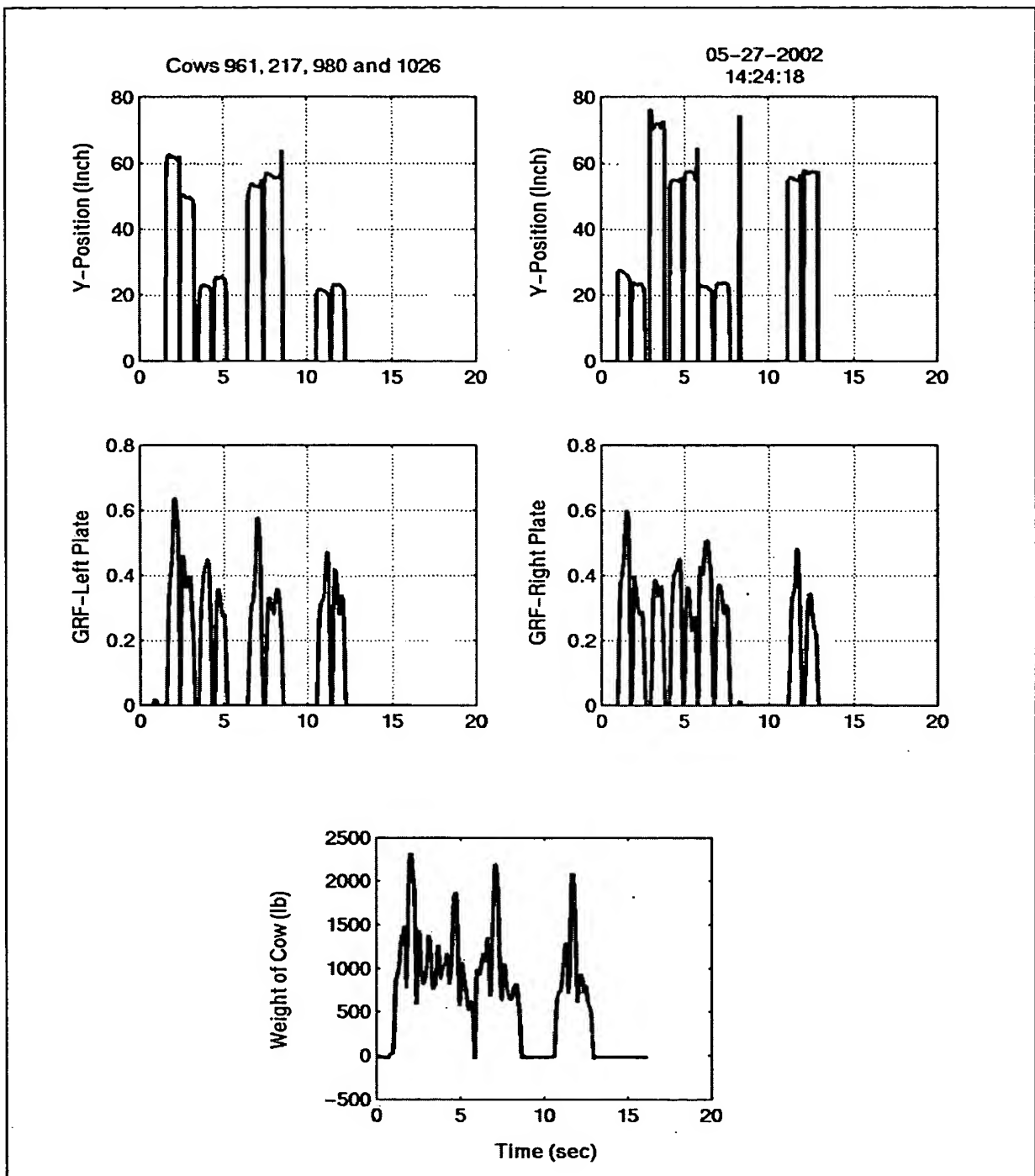
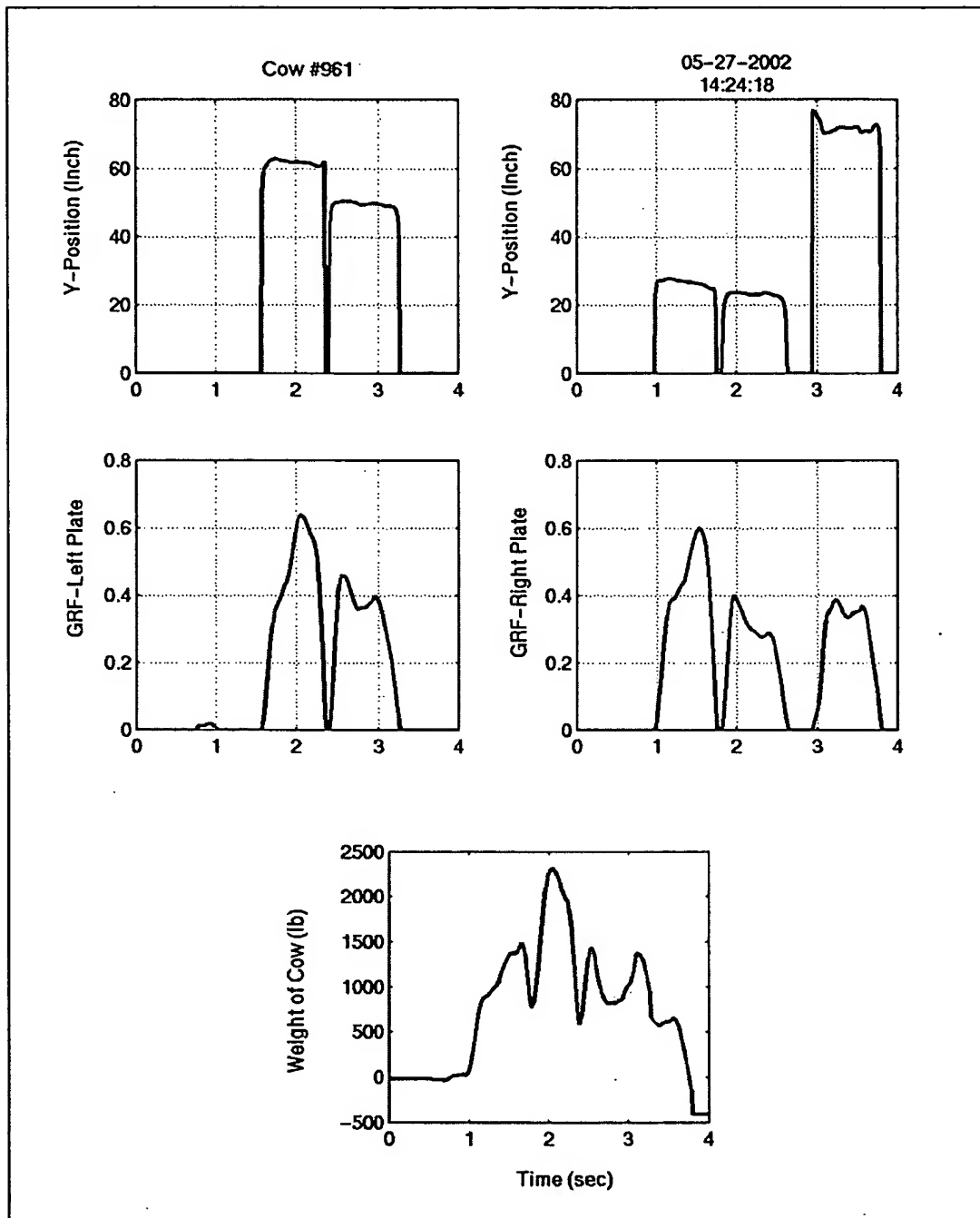


Figure 11(d)

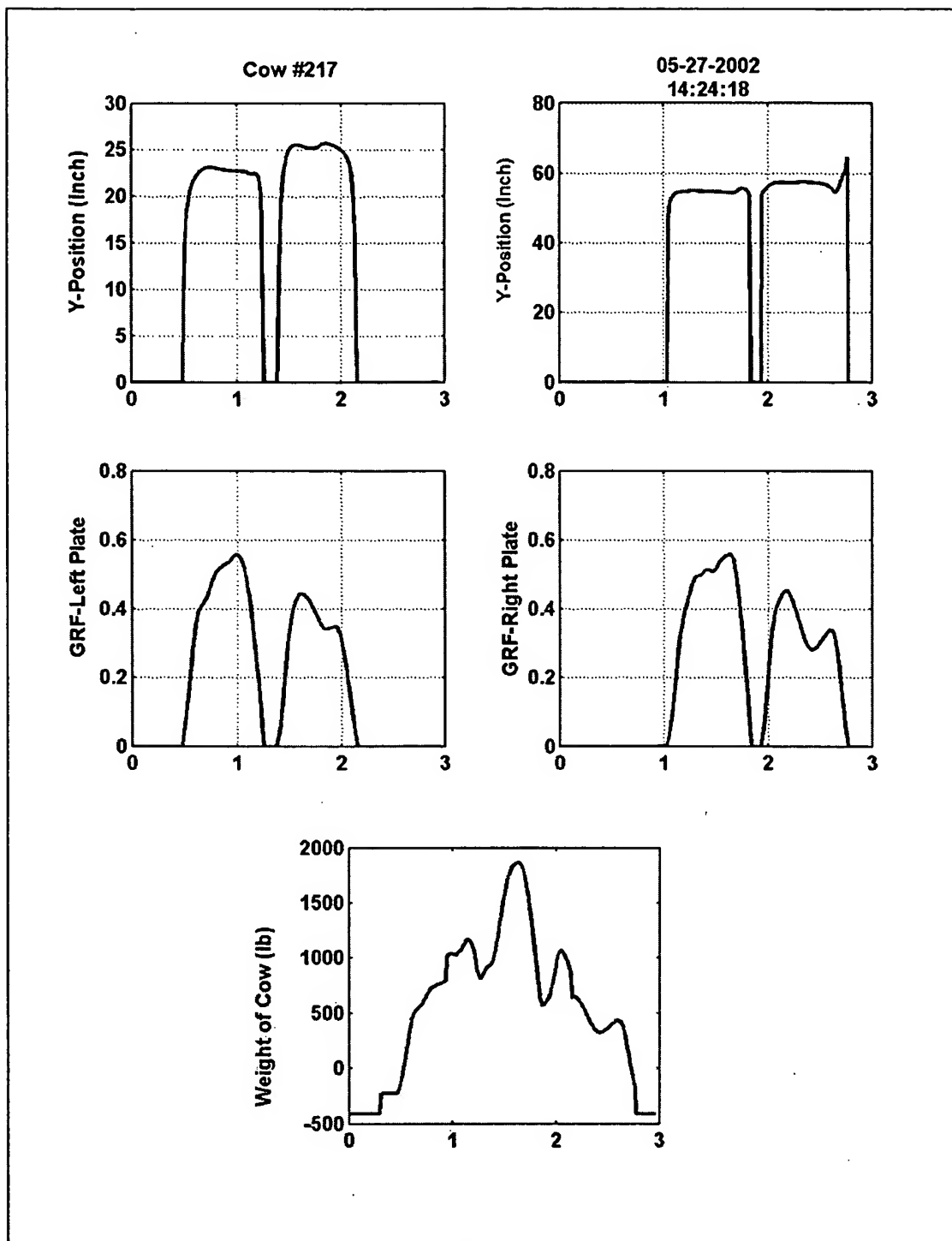


**Figure 12(a)**

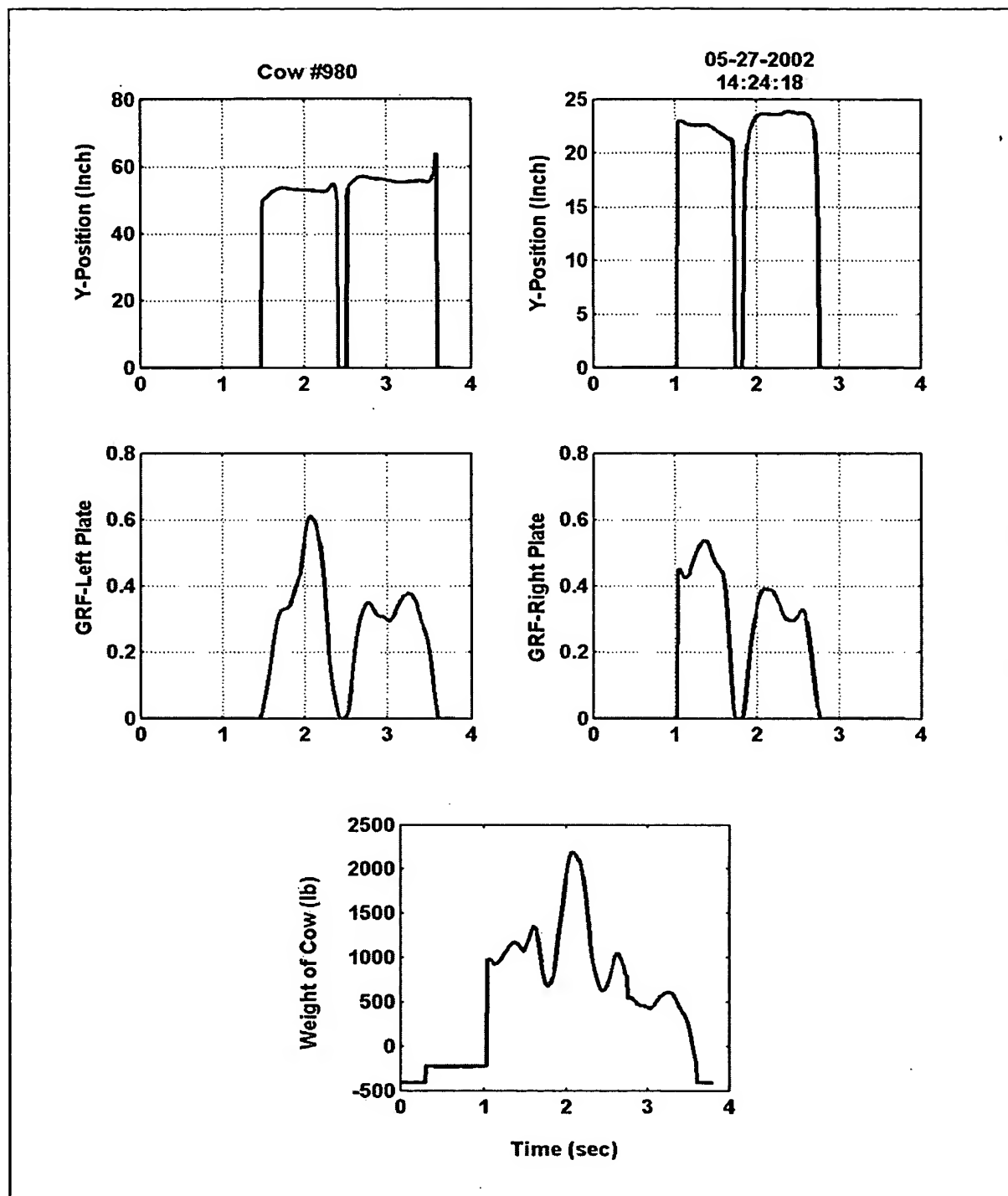




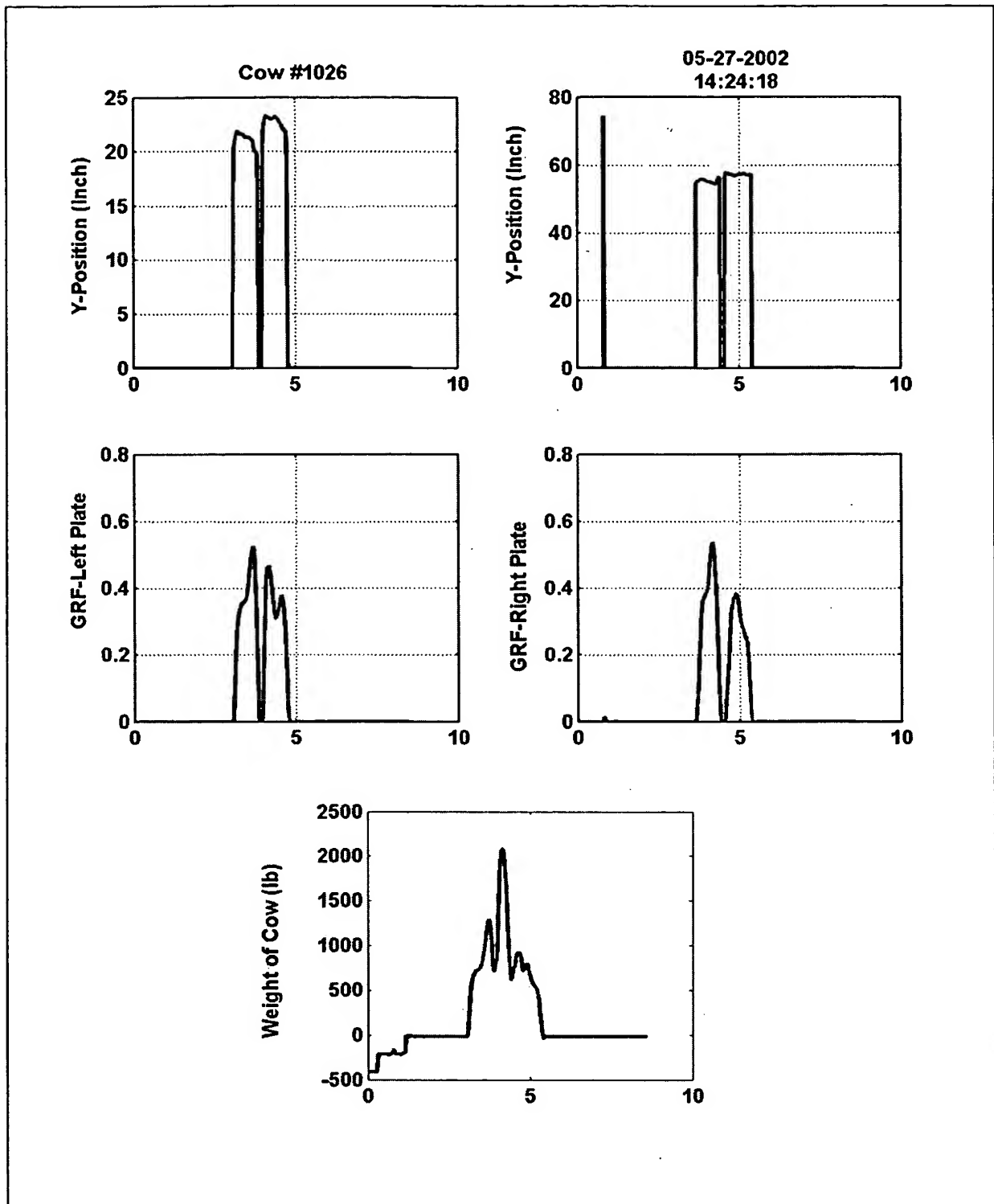
**Figure 12(b)**



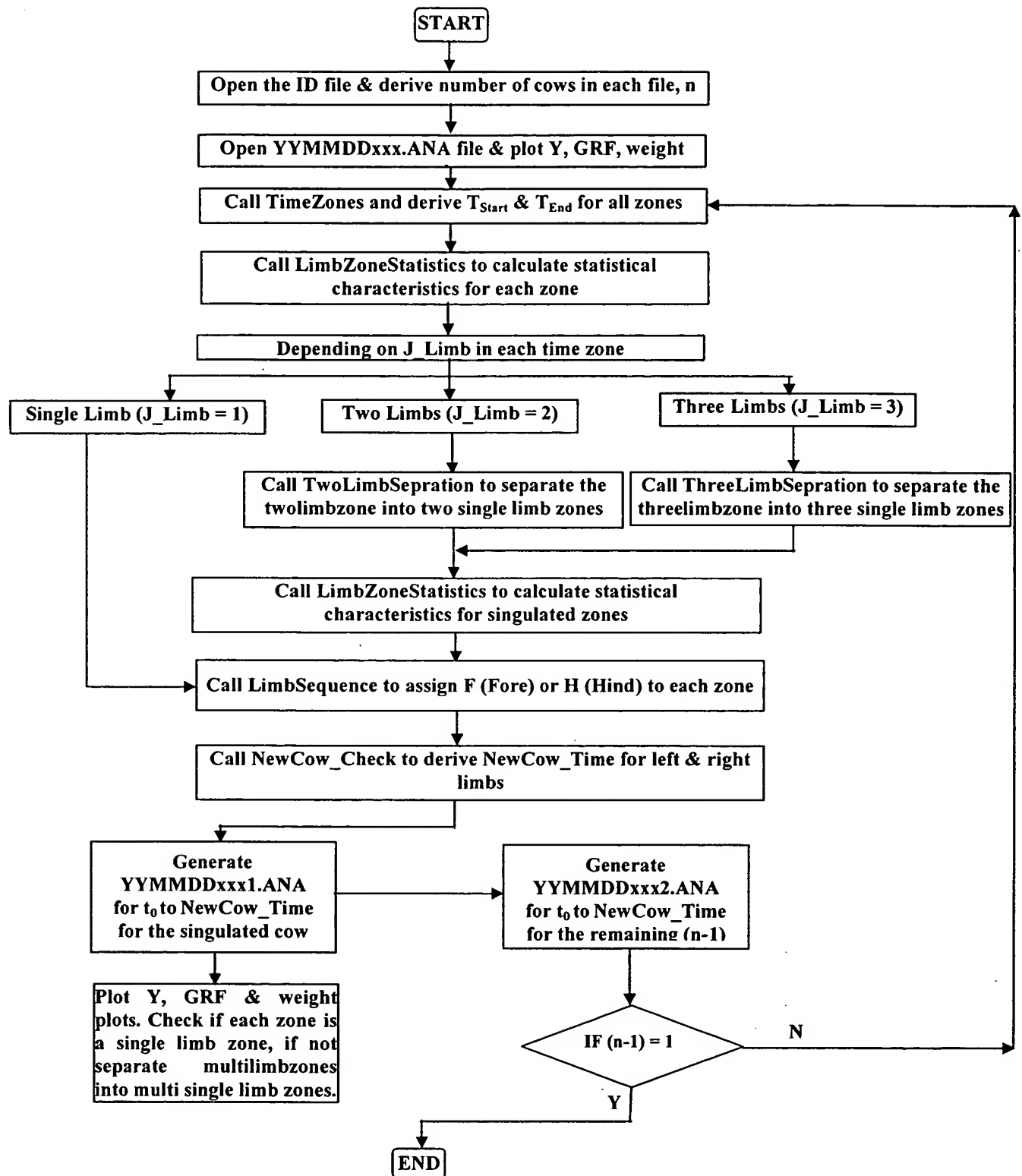
**Figure 12(c)**



**Figure 12(d)**



**Figure 12(e)**



***Figure 13***